

# INTRODUCTION OF DATABASE

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## What's Database

- ◆ An organized collection of data
- ◆ Can easily be accessed, managed, and updated

### Relational Database:

- ◆ Data are organized as a set of tables.
- ◆ Each table contains records(horizontal rows of the table).
- ◆ Each record contains fields(vertical columns of the table).
- ◆ Fields can be of many different data types.

## EXAMPLE

**Table name: USER**

	field				
header	user_id	password	user_name	...	created_date
record	user1	1111	Tom		12/10/2012
	user2	2222	Kate		13/10/2012
	...	...	...		...

## DATABASE ACCESS (SQL)

- ◆ **SQL(Structured Query Language)**
  - ◆ **Data Definition**
    - ◆ CREATE TABLE
    - ◆ DROP TABLE
    - ◆ ...
  - ◆ **Data Manipulation**
    - ◆ SELECT - Fetch rows from table
    - ◆ INSERT - Add a row into table
    - ◆ UPDATE - update rows in table
    - ◆ DELETE - Remove rows from table

# CREATE TABLE

Create a new table

```
CREATE TABLE table_name (  
Field1 type primary key,  
Filed2 type,  
...  
);
```

# DROP TABLE

Delete a table

```
DROP TABLE table_name;
```

# EXAMPLE

Table name: user

user_id	password	user_name	privilege	created_date

Create the user table

```
CREATE TABLE user (  
user_id VARCHAR(20) primary key,  
password VARCHAR(20),  
user_name VARCHAR(30),  
privilege INT(10),  
created_date DATETIME  
);
```

# EXAMPLE

Table name: user

user_id	password	user_name	privilege	created_date

Delete the user table

```
DROP TABLE user;
```

# INSERT

Insert a row into table

```
INSERT INTO table_name(field1, field2, ...)  
VALUES (value1, value2, ...);
```

# EXAMPLE

Table name: user

user_id	password	user_name	privilege	created_date
user1	1111	Tom	1	2012-10-17 23:30:00

Insert a row into user table

```
INSERT INTO user (user_id, password, user_name, privilege, created_date)  
VALUES ('user3', '1111', 'Tom', 1, '2012-10-17 23:30:00');
```

# SELECT

Fetch records from table

```
SELECT field1, field2, ...  
  
FROM table_name  
  
WHERE condition  
  
ORDER BY field1, field2;
```

# EXAMPLE

Table name: user

user_id	password	user_name	privilege	created_date
user1	1111	Tom	1	2012-10-15 13:00:52
user2	2222	Kate	2	2012-10-23 03:22:30
id1	3333	Rose	2	2012-09-23 22:20:00

1. Fetch single row from table

```
SELECT *  
FROM user  
WHERE user_id = 'user2';
```

Result:

```
mysql> select * from user where user_id = 'user2';  
+----+-----+-----+-----+-----+  
| user_id | password | user_name | privilege | created_date |  
+----+-----+-----+-----+-----+  
| user2 | 2222 | Kate | 2 | 2012-10-23 03:22:30 |  
+----+-----+-----+-----+-----+  
1 row in set (0.00 sec)
```

# EXAMPLE

Table name: user

user_id	password	user_name	privilege	created_date
user1	1111	Tom	1	2012-10-15 13:00:52
user2	2222	Kate	2	2012-10-23 03:22:30
id1	3333	Rose	2	2012-09-23 22:20:00

2. Fetch multiple rows from table and sort the results in descending

```
SELECT user_id, user_name  
FROM user  
WHERE privilege =2  
ORDER BY user_name DESC;
```

Result:

```
mysql> select user_id, user_name from user where privilege=2 order by user_name desc;  
+-----+-----+  
| user_id | user_name |  
+-----+-----+  
| id1     | Rose     |  
| user2   | Kate     |  
+-----+-----+  
2 rows in set (0.10 sec)
```

# EXAMPLE

Table name: user

user_id	password	user_name	privilege	created_date
user1	1111	Tom	1	2012-10-15 13:00:52
user2	2222	Kate	2	2012-10-23 03:22:30
id1	3333	Rose	2	2012-09-23 22:20:00
id2	4444	Jack	2	2012-09-25 12:00:22
user3	5555	newuser	3	2012-09-25 12:00:22

Update rows in user table

```
UPDATE user SET user_name = 'Jacob'  
WHERE user_id = 'user3';
```

# UPDATE

Update rows of table

```
UPDATE table_name  
  
SET field1 = value1, field2 = value2, ...  
  
WHERE conditions;
```

# DELETE

Delete rows from table

```
DELETE FROM table  
  
WHERE conditions;
```

# EXAMPLE

Table name: user

user_id	password	user_name	privilege	created_date
user1	1111	Tom	1	2012-10-15 13:00:52
user2	2222	Kate	2	2012-10-23 03:22:30
id1	3333	Rose	2	2012-09-23 22:20:00
id2	4444	Jack	2	2012-09-25 12:00:22
user3	5555	newuser	3	2012-09-25 12:00:22

Delete a row from user table

```
DELETE FROM user
WHERE user_id = 'user3';
```

# USE MYSQL CLIENT

## 1. Install MYSQL

Visit the website below, choose your os and download the package.  
<http://dev.mysql.com/downloads/mysql/>

## 2. Connect to the MYSQL server

```
>mysql -h localhost -u myname -p mypass dbname
```

## 3. Execute SQL

```
mysql> CREATE TABLE ...
```

# MYSQL

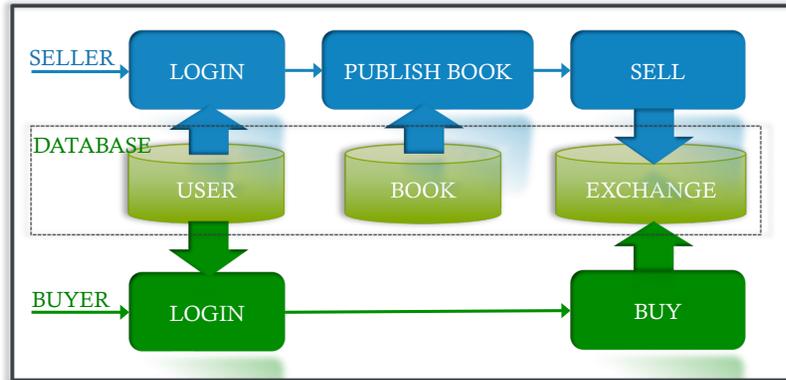
- ◆ The most used open source relational database system
- ◆ Free
- ◆ Can be easily managed by web-based tool (phpMyAdmin)

# USE MYSQL IN JAVA

- ◆ Step1: Design your tables
- ◆ Step2: Create tables and add initial data using mysql client
- ◆ Step3: Access tables from JAVA code (JDBC)

# 1. DESIGN YOUR TABLES

In project2, we need tables to store users, books, and exchange history



# CREATE DOCUMENT

Before creating the real tables, make document for your table design

.User Table (store user login info)

Field Name	type	length	PK	Purpose(Note)
user_id	VARCHAR	20	O	Login ID
password	VARCHAR	20		Login password
privilege	INT	1		
...	...	...		

.Book Table (store book info)

Field Name	type	length	PK	Purpose(Note)
ISBN	CHAR	13	O	The ISBN of book
title	VARCHAR	100		Book's title
author	VARCHAR	100		Book's author
...	...	...		

# CREATE DOCUMENT

.Transaction Table (store transaction history)

Field Name	type	length	PK	Purpose(Note)
tran_id	CHAR	20	O	Transaction ID
buyer	VARCHAR	20		Buyer's user id
seller	VARCHAR	20		Seller's user id
...	...	...		

**YOU MAY NEED MORE TABLES FOR YOUR PROJECT!**

# SOME DETAILS

.Primary key (PK)

- ◆ A combination of columns which uniquely specify a row
- ◆ A table can have at most one primary key
- ◆ The columns of primary key cannot be NULL

.Data type(of fields)

- ◆ INT: store integer
- ◆ CHAR: store string(the length is fixed)
- ◆ VARCHAR: store string(the length is variable)
- ◆ ...

## 2. CREATE TABLES

Create tables in advance before starting to code.

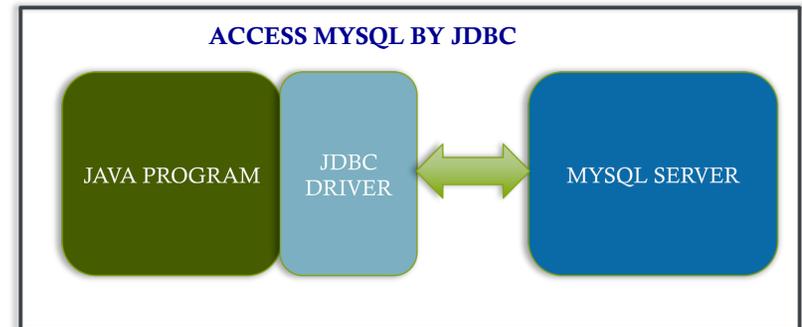
**\*You don't need to create them in your JAVA program!**

- ◆ Translate your tables design into SQL(CREATE TABLE)
- ◆ Execute the SQL
- ◆ Insert initial data if necessary

\*In project2, you may have to add book info into book table in advance.

## 3. USE MYSQL IN JAVA

JDBC: Java Database Connectivity. It enables Java programs to execute SQL statements.



## 3. USE MYSQL IN JAVA

**THREE STEPS TO USE JDBC:**

**1. Download JDBC driver (MYSQL connector/J)**

<http://dev.mysql.com/downloads/connector/j/>

**2. Add the downloaded JAR file into your java project(build path)**

**3. Use JDBC classes to execute SQL**

## EXAMPLE

### CONNECT TO SERVER

```
import java.sql.*;
...
Connection conn = null;

//connect to mysql server
void Connect(){
    try{
        conn = DriverManager.getConnection("jdbc:mysql://216.119.150.207:3306/team",
            "team", "password");
    }
    catch(Exception e){
        e.printStackTrace();
    }
}
```

## EXAMPLE

### SELECT

```
//fetch rows from table
void FetchRows(){
    String sql = "SELECT * from user";
    PreparedStatement ps = null;
    try{
        ps = conn.prepareStatement(sql);
        ResultSet rs = ps.executeQuery();
        while(rs.next()){
            //get data
            String user_id = rs.getString("user_id");
            String name = rs.getString("user_name");
            // display the data
            System.out.println("user_id:"+ " "+user_id);
            System.out.println("name:"+ " "+name );
        }
    } catch(Exception e) { e.printStackTrace();}
}
```

## EXAMPLE

### INSERT

```
//insert rows into table
void InsertIntoTable(){

    String sql = "INSERT INTO user (user_id, password, user_name, privilege, created_date)
        VALUES ('user5', '1111', 'Tom', 1, '2012-10-17 11:30:00')";

    PreparedStatement ps = null;
    try{
        ps = conn.prepareStatement(sql);
        ps.executeUpdate();
    }
    catch(Exception e){
        e.printStackTrace();
    }
}
```

## EXAMPLE

### DISCONNECT

```
//disconnect from mysql server
void Disconnect(){
    try{
        conn.close();
    }
    catch(Exception e){
        e.printStackTrace();
    }
}
```

THANK YOU!

